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NASA/Johnson Space Center

JSC Ergonomics Program

Definition














Ergonomics is the science of fitting the task to the worker to maximize productivity while reducing discomfort, fatigue and injury.

Statistics

Per BLS in 2014, musculoskeletal disease (MSD)

- 32% of all workplace injuries and illnesses requiring days away from work (33% in 2013, 28% in 2009)
- 13 days - median days away from work (9 days for all types)

Risk Factors

 <p>FORCE</p>	<p>High force demands = increased MSD risk Force-related MSD hazards can be present when lifting, pushing, pulling, carrying, gripping, using tools.</p> 
 <p>POSTURES</p>	<p>Awkward or static postures = increased MSD risk Posture-related MSD hazards can be present when bending, twisting, reaching, kneeling.</p> 
 <p>REPETITION</p>	<p>Repetitive movements/actions = increased MSD risk Repetition-related MSD hazards can be present when doing the same thing over and over again, with little time for rest.</p> 
<p>OTHER</p>	<p>Other MSD hazards that can increase MSD risk Include contact stress, hand-arm vibration, whole-body vibration, hammering with hand/knee, working in cold temperatures or hot environments.</p> <div>     </div> <div>    </div> <div> <p>Contact stress</p> <p>Hand-arm/whole-body vibration</p> <p>Using hand/knee as hammer</p> <p>Cold and/or hot temperatures</p> </div>

Program

Log Into SATERN



- Training
- Assessments
 - Office workstation
 - Push/Pull/Lift
 - Controls
- Evaluations
 - Ergonomic accessories
 - Furniture
- Awareness



Office Ergonomics and Health

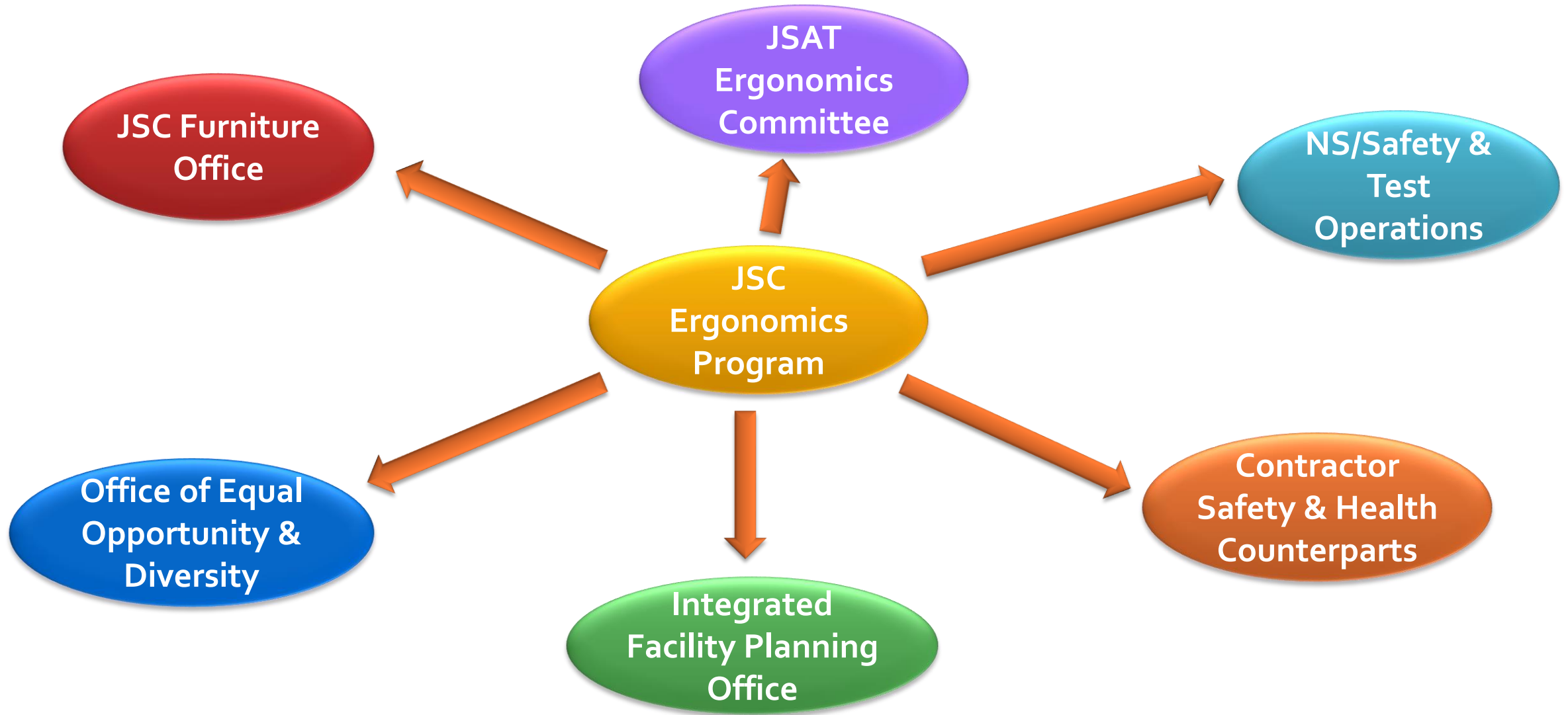
(Mis)Perceptions

- How tough can it be?
- We're different than industry...
- **Furniture will solve all problems**
- *Furniture is the "cause" of all problems*
- Computer workstation assessments should take care of everything
- Training people once is enough
- Ergonomics is too expensive
- ***Taking a "break" means unproductive time***

JSC Program

- Monthly Instructor-led Office & Occupational Training
 - Newly updated computer-based training courses for both
- Computer Workstation Evaluations
 - Increased (lots of requests for sit-stand workstations)
- Try-before-you-buy Accessory Library
- Furniture Procurements
- Field assessments

Partners



Injuries

- Employees & managers may not recognize or associate discomfort or pain with repetitive stress
- Clinic First Policy
 - Occupational medical staff
 - Some DME
 - Referrals
 - Case Management
 - Documentation
- *But hopefully it doesn't get that far*



Computer Ergonomics



Computer Ergonomics



Adjustments

1. Back Height
2. Inflatable Lumbar
3. Back Angle
4. Seat Height
5. Seat Angle
6. Seat Tilt Tension
7. Forward Tilt-stop
8. Seat Slider (Depth)
9. Arm Post Width
10. Arm Height
11. Arm Pad Width
12. Arm Pad Fore/Aft
13. Arm Pad 360° Angle

- Furniture
 - Chairs
 - Worksurfaces
 - Adjustable monitor arms
 - Articulating keyboard trays
- Encourage taking a break at least once per hour



Current Chairs



Center Operations Directorate
JOHNSON SPACE CENTER



05/2014

Currently Utilized for NEW Requests



ECD Signature Petite Chair
(Blue Fabric)



Sit-on-It Focus Chair



ErgoForce High Back Chair
(Plus Size)

Previously Utilized, Still Around JSC, SCTF, and Ellington



Neutral Posture
XSM Petite Chair



Dauphin Contour Chair
(3rd Generation)



Neutral Posture
Shark Bite Chair



Neutral Posture
5000 Series,
Criterion Chair



Center Operations Directorate
JOHNSON SPACE CENTER



05/2014

Existing Workstation Chair Types



Gray



Contemporary



Charvoz



Dauphin (2nd)



Dauphin (3rd)



Sitmatic



Unicor



Seating, Inc.



Hayworth



Neutral Posture



Criterion Plus



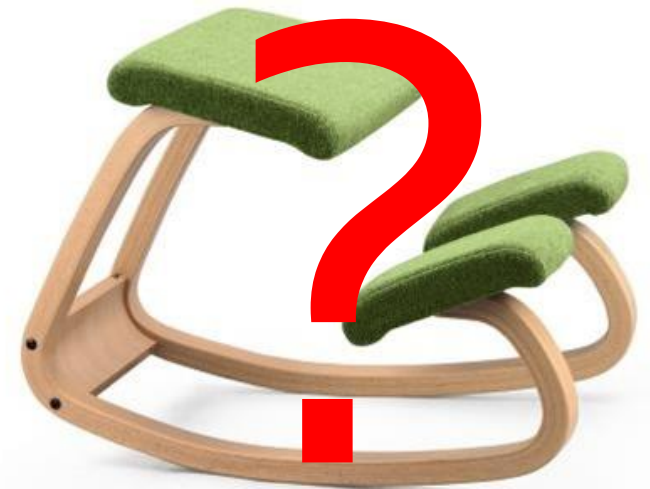
Aeron

Vintage Chairs...

Still Here

Computer Ergonomics

■ Alternative Seating



Computer Ergonomics

- Workstation

- Areas of Concern:

- Neck position, wrist angle, elbow angle, shoulder width, foot position, lumbar support, forearm support, wrist rest

- Ergonomic Accessories

- Neutral position mice, split keyboards, anti-glare monitors, adjustable monitor arms, foot rests

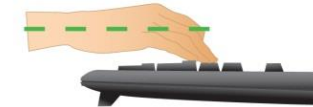
- *Take a break, get up & move periodically*



RIGHT!



RIGHT!



WRONG!



WRONG!



Computer Ergonomics

■ Vision

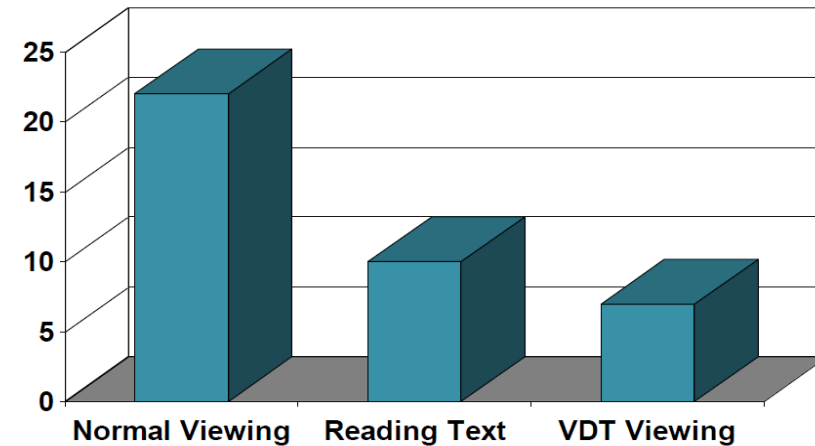
■ Eyestrain

- Increase the font size if necessary
- Take a break: 20/20/20 rule

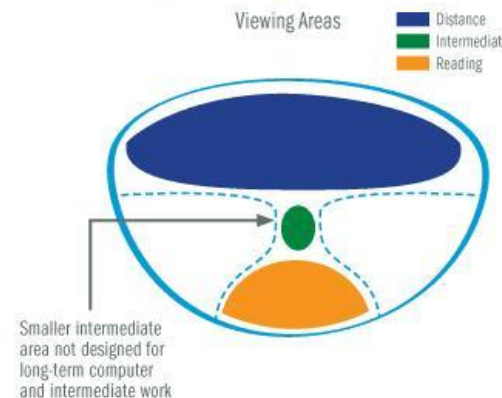
■ Progressives

- ***The monitor can only go as low as the worksurface***
- Consider computer glasses

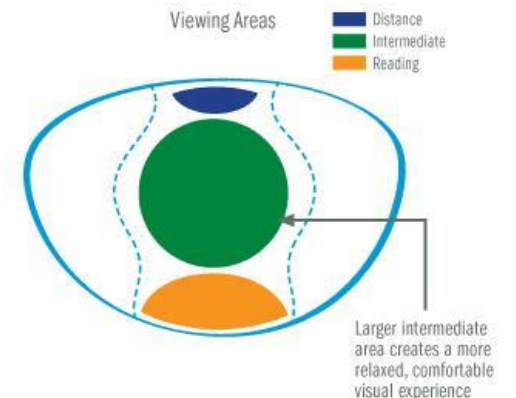
Blink Rates



Typical Progressive Lens



Computer Lens



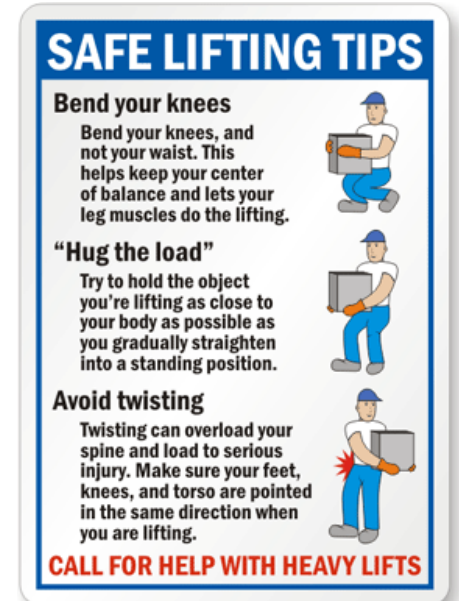
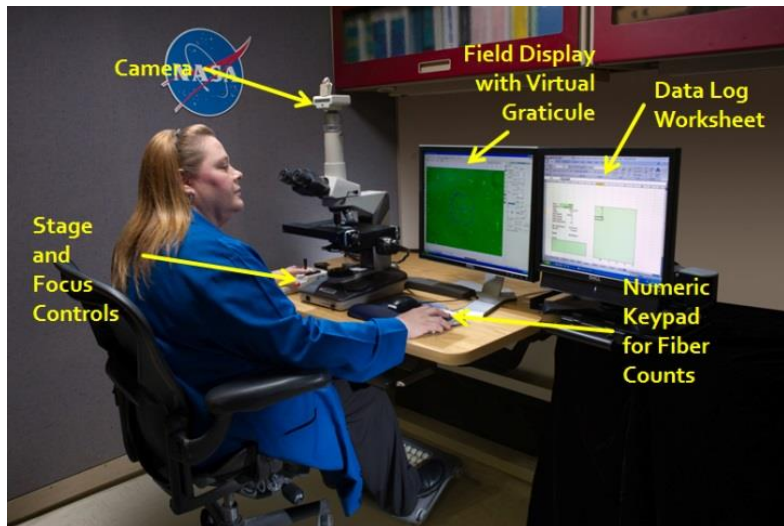
Beyond the Desk Ergonomics

- Conference Rooms
- Control Rooms



Occupational Ergonomics

- Back protection
- Carts/scissor lifts
- Microscopes
- Assembly



Occupational Ergonomics

- What not to do: Hippo Hoppers

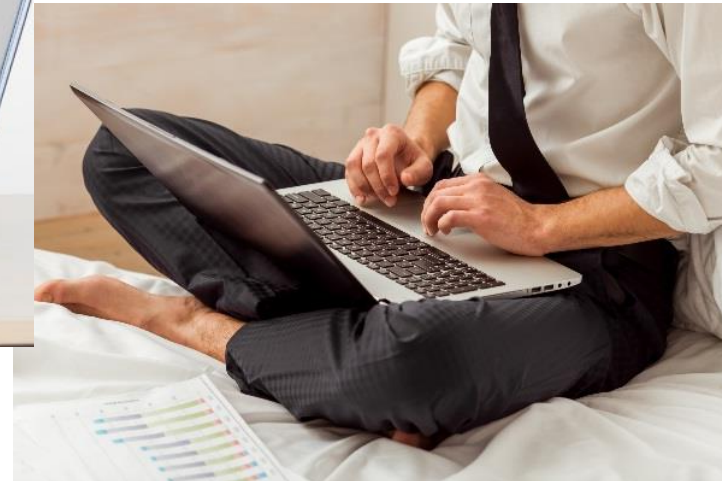
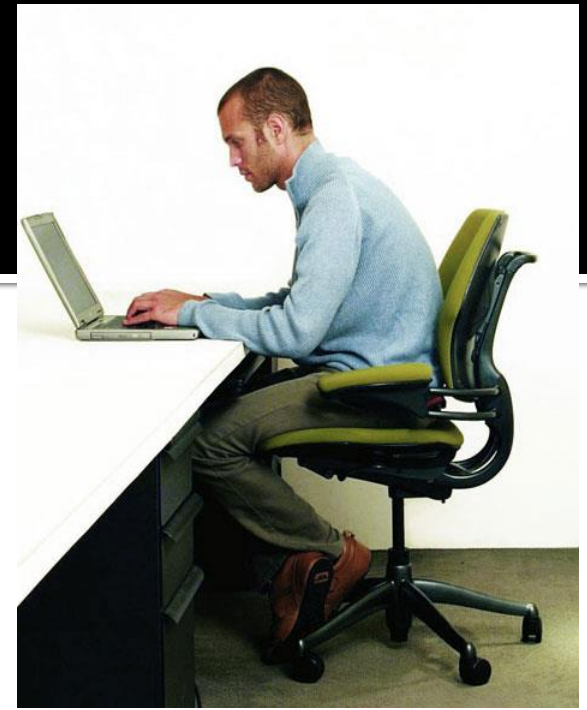


Hot Topics – Aging Workforce

- Aging workforce
 - By 2030, 65+ will be 20% of the population
 - Expected to grow 4.1% annually
 - Affects strength, vision, flexibility, balance, reaction time, hearing
- Accommodations
 - SW for visually impaired
 - Degenerative disorders
 - Amputees
 - Recovery from injury or surgery

Laptop Use

- *Use them anywhere, they are portable!*
- Monitor & keyboard tied together
 - One-size-fits-none
- Adjustment is either/or – 1) reading or 2) typing



Laptop Use

- What can you do?
 - Portable workstation setup
 - Lap desk
 - Table top
 - *Take a break at least once an hour*



Laptops & Conference Rooms

Portable adjustable
laptop stand for
conference room use



Sit-Stand Workstations

Sitting is the new smoking.















Dr. James Levine, Mayo Clinic-Arizona State University



The Problem:

- U.S. adults spend upwards of 9 hours each day in seated and sedentary positions, most of that at work.

Risk Factor Focus

 <p>FORCE</p>	<p>High force demands = increased MSD risk Force-related MSD hazards can be present when lifting, pushing, pulling, carrying, gripping, using tools.</p> 
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Sit-Stand Workstation Types

■ Sit-Stand Furniture



■ Sit-Stand Accessory



Ideal Solution

Redesign the Job:

- Duties require leaving desk
- Vary computing & non-computing duties
- Flexible work schedules
- Encourage regular breaks
- Discourage working through breaks.

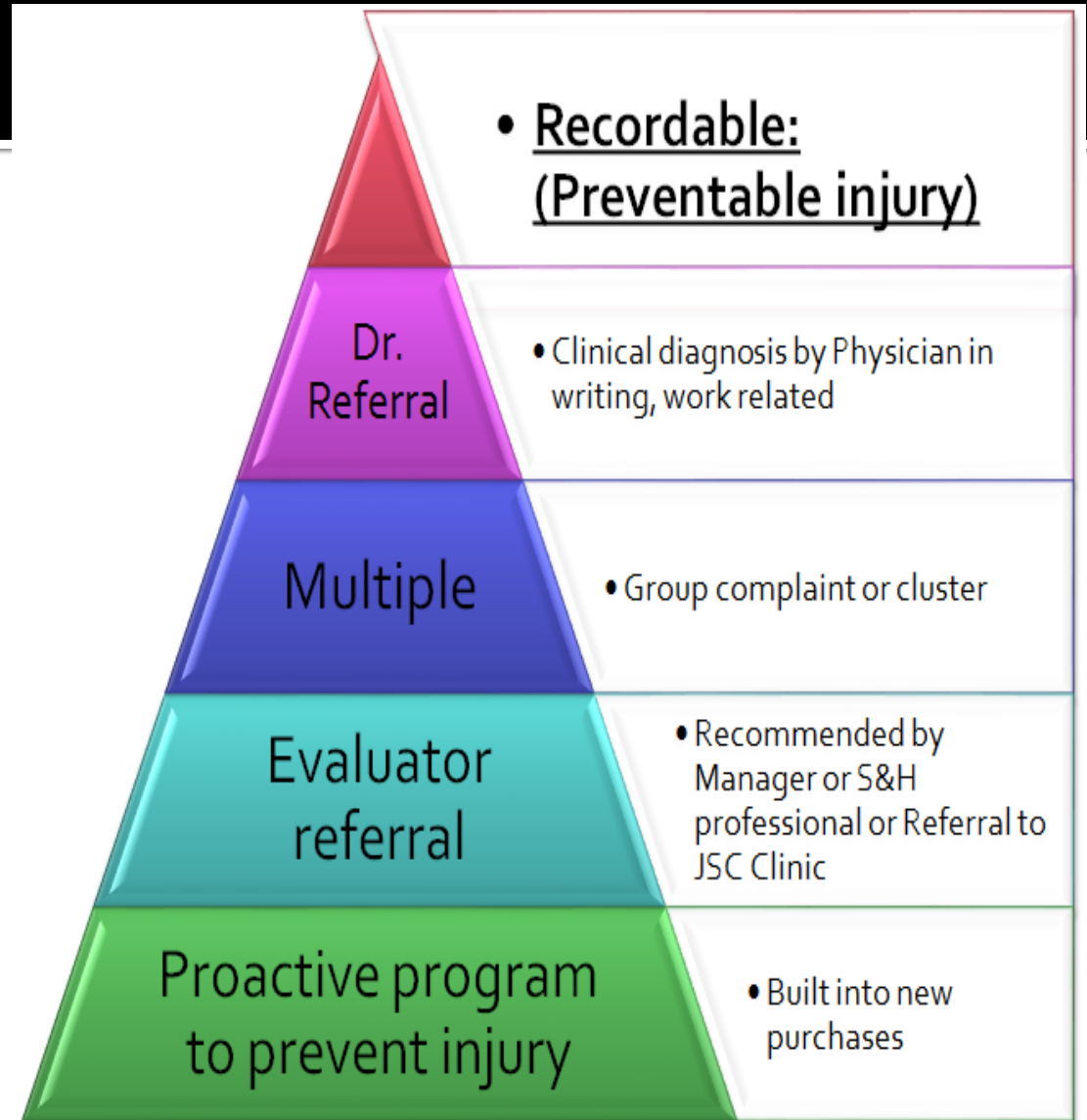


Change the Culture:

- Encourage walking to co-workers' desks to talk instead of emailing them.
- Breaks improve productivity/creativity
- Skipping breaks can lead to stress/exhaustion.

Criteria & Priority

- Work demands limit breaks
- Pain or discomfort after sitting 30 minutes or less
- History of back problems



A well-designed sit-stand workstation:

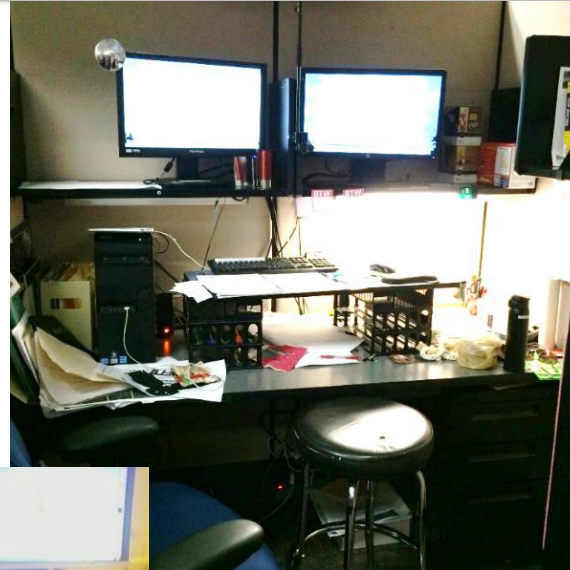
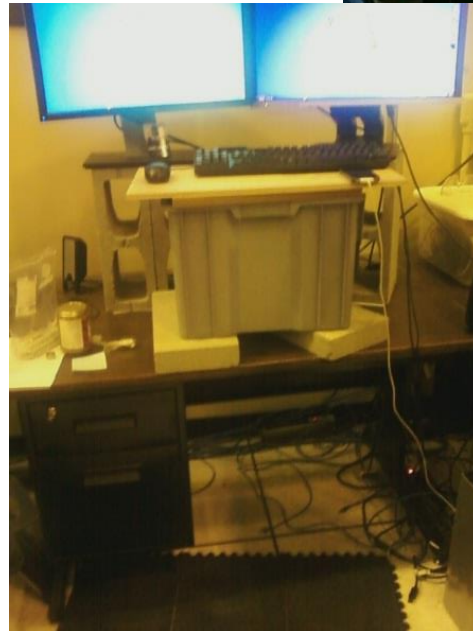
- Accommodates *both sitting & standing positions*
- Easy-to-adjust components
- Positions keyboard and mouse at same height, at or slightly below elbow height.
- Top of monitor positioned at line of sight with neutral neck/back posture

Note: *Standing-only workstations do not help and create other health problems.*



Self-Accommodation

- These are not solutions.



JSC Program



Ergonomics

Search this site



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Documents ▸

Tools ▸

Site Contents

JSC Ergonomics Program

The study of Ergonomics involves examining people and the work they perform. The purpose is to fit the job to the worker, which reduces stress, muscle fatigue and the number and severity of work related musculoskeletal disorders (MSDs).

Call Ellen Lackey at x36726 with questions or to request an ergonomic evaluation

Ergonomics

- Ergonomic Training Courses
- JPR 1700.1, Chapter 5.5 Ergonomics Program
- Learn more about the JSAT Ergonomics Committee

Checklists

- Computer Workstation Checklist
- Ergo Workstation and Symptom Checklist
- HP Ergonomics Guide

Cue Cards

- JSAT Ergonomic Exercises Card
- JSAT Proper Workstation Posture Badge Card
- Ergo-Guide for Computer Workstation - Sitting & Standing

Furniture and Accessories:

- JSC Ergonomic Assessment for Furniture
- JSC Office Furniture Information
- Ergonomic Chairs at JSC, SCTF and EF
- Ergonomic Equipment Loaner Program
- Laptop Accessories

Sit-Stand Workstations

- Considering a Sit-Stand Workstation?
- Guidance for Supervisors
- Sit-Stand Workstation Options at JSC

JSC Resources

SIT/STAND COMPUTER WORKSTATION FACT SHEET



Considering a sit/stand workstation?

- If you have a job that requires you to frequently leave your desk, have a flexible work schedule, or can leave your desk when you want, then you probably do not need a sit/stand workstation.
- If you experience pain or discomfort sitting for 30 minutes or less, a sit/stand workstation may help.

What else can you do?

JSC Occupational Health does not make mandatory recommendations for sit/stand workstations. These are one of a number of solutions to workplace ergonomic issues. Others solutions include:

- Avoid working too long in one position
 - ✓ Stand up and move for at least two minutes every half hour.
 - ✓ Take regular walking breaks.
 - ✓ Don't work through breaks.
 - ✓ Step outside occasionally for fresh air.
 - ✓ Stretch periodically.
- Use the stairs instead of the elevator.
- Take a lunch break away from your desk.
- When possible, walk to co-workers' desks to talk instead of emailing them.
- Vary your posture between sitting and standing.
- Vary your task between computing and non-computing.
- Remember, taking breaks also improves productivity and creativity — and skipping breaks can lead to stress and exhaustion.

Standing is not the Solution!

Going from sitting all day to standing all day doesn't help and can create other problems:

- Standing for too long can stress your back because muscle groups in your legs, hips, back and neck are tensed.

- Prolonged standing is associated with greater on circulatory system, legs and feet.

What makes a good sit/stand workstation?

A well-designed sit-stand workstation:

- Is a height-adjustment range large enough to ergonomically accommodate *both the sitting and standing positions*
- Has easy-to-adjust components
- Positions the keyboard and mouse at the same height that can be set at or slightly below elbow height
- Has a monitor platform or arm that allows the of the monitor to be set at the same height as user's eyes.

Whom should you contact?

- Talk to your manager about the amount of time you have to spend at your desk.
- If you are experiencing pain, visit the JSC Clinic x34111.
- Request an ergonomic evaluation from your company's Health and Safety Group, or from Occupational Health x36726.
- For more information, see the JSC Ergonomic Program website (<https://sashare.jsc.nasa.gov/sd/SD3/SitePage/ergonomics.aspx>).
- Note: Proposed sit/stand workstation furniture accessories used onsite at JSC must be reviewed first by one of the SD3/Occupational Health Ergonomic Program Leads, Ellen Lackey x3647 or Penney Stanch x37983.

SIT/STAND WORKSTATIONS INFORMATION FOR MANAGERS



The Problem:

- U.S. adults spend upwards of 9 hours each day in seated and sedentary positions, most of the time at work.
 - ✓ Sedentary behavior is a significant health risk and a major contributor to obesity and chronic diseases such as Type II diabetes, cancer, and cardiovascular disease.
 - ✓ Sitting for extended periods of time has been linked to musculoskeletal disorders as well as high incidence of back, neck, and shoulder complaints.

Ideal Solution:

JSC Occupational Health does not make mandatory recommendations for sit/stand workstations. These are one of a number of solutions to workplace ergonomic issues. Others solutions include designing jobs that:

- Require an employee to frequently leave the desk.
- Vary duties between computing and non-computing.
- Have flexible work schedules allowing employees to leave the desk when they want.
- Encourage regular breaks and discourage working through breaks. Remember, taking breaks also improves productivity and creativity — and skipping breaks can lead to stress and exhaustion.

Sit-Stand Workstations

- Accessory for Desktop



[Ergotron Workfit A – for iMac](#)



[Mount-It! MI-7910](#)



[Ergotron Workfit T/TL](#)



[Ergotron Workfit S](#)



[Ergotron Tall User Kit](#)



[Mount-It! MI-7902](#)



[Humanscale Quickstand](#)



[Varidesk Pro Plus](#)



[Ergotron Workfit A](#)

Ergonomic Tips to Maximize Your Comfort When Computing



Upright Sitting



Reclined Sitting



Declined Sitting



Standing

6. Healthy Computing Habits

- Use a softer touch when keying; relax your grip on the mouse
- Avoid working too long in one position
- Change your body posture frequently
- Take frequent breaks. Stretch periodically
- Give your eyes a visual break

1. Chair and Posture

- Use the backrest of the chair to provide full support to your lower back
- Make sure your chair allows clearance behind your knees when seated against the backrest

Maintain proper body posture by:

- Sitting with your hips and knees at a 90 degree or greater angle
- Keep your feet flat on the floor or on a footrest
- Keep your arms relaxed at your sides; ideally with elbows at 70-135 degrees
- Change posture frequently; common postures include upright sitting, reclined sitting, declined sitting and standing

5. Accessories

- Get a head-set if you regularly talk on the phone for extended periods of time. Use a lowered voice

Use an adjustable document holder to:

- Place reference materials as close to the computer screen as possible
- Keep materials at the same height and distance as your computer screen
- Use your ergonomic accessories to support body posture (e.g. lumbar support, arm rests, monitor blocks, external keyboard)

2. Monitor

- Place the monitor directly in front of you—about an arm's length away
- Position the top of the monitor screen at, or below, eye level

3. Keyboard and Input Devices

- Adjust the keyboard or chair height to keep forearms, wrists and hands in a straight line
- Place mouse and other input devices near to and at the same height as your keyboard
- Keep your elbows close to your body

4. Work Area and Lighting

- Allow ample clearance to move your knees and legs under the keyboard and desk
- Avoid contact stress with the edge of the desk and keyboard

To reduce glare and shadows on your work surface:

- Adjust window shades or decrease overhead lighting
- Adjust the monitor screen or add an anti-glare filter
- Add a task light to properly illuminate paper references

Get Moving

- How many times did I mention “Take a break”?
- *Prolonged sitting is bad, prolonged standing is bad*
 - Prolonged sitting is associated with high incidence of back, neck and shoulder complaints.
 - Prolonged standing is associated with greater strain on circulatory system, legs and feet.

Get Moving

- What you can do:
 - Conventional 15 minute morning & afternoon rest breaks
 - Don't work through breaks
 - 5 minute rest breaks every hour (get up & away from computer)
 - Micro-breaks rather than long duration breaks
 - Change posture; vary positions between sitting and standing
 - Vary tasks, computing and non-computing
- ***Your best posture is your next posture***

Get Moving



Ergonomic Exercises

Stretch Exercises



1 Neck Stretch - Slowly bring ear to shoulder—hold; then chin to chest—hold; bring chin 1/2 way between shoulder and chest—hold.



2 Chest - Place hands on back of head; do not lock fingers. Press elbows back—hold.



3 Backbend - Place feet shoulder-width apart. Place hands on buttocks and gently lean back; hold.



4 Hamstring - Extend leg with heel on chair (or ground); pull toe up. Place hands on knee. Lean forward until stretch is felt somewhere between calf and buttocks—hold.



5 Hips - Extend right leg back and right heel off floor. Keep your back straight, bend the knee and lunge forward; hold, then switch.



6 Wrist - With elbow straight, gently bend back hand until stretch is felt in forearm; hold. Switch hands. Note: if you have carpal tunnel syndrome, use caution with this stretch.



7 Hip/Buttock Stretch - While sitting, cross left leg so ankle rests on top of right knee. Gently press on inside of left knee until stretch is felt deep in hip.



Ergonomic Exercises

Strengthen Exercises



1 Shoulder Blade Pinch - Pinch shoulder blades together; hold for 10 seconds. Relax and Repeat.



2 Hand Squeezes - Open and close hand repeatedly. For added resistance, place a rubber band around fingers.



3 Abdominal Press - Press lower back into chair back; Relax and repeat. Don't forget to breathe!



4 Sky Punch - While standing or sitting, slowly reach one arm up while pulling the other arm down—as if pulling and resisting a giant rubber-band. Alternate arms repeatedly.



5 Toe Raises - Take off shoes. While holding onto chair, raise and lower heels.



6 Wall Push-up - While standing, lean against wall. Place hands shoulder width apart. Slowly bring yourself toward the wall, then press out.



7 Leg Squat - Keeping back straight and heels on floor, slowly bend legs to 60°. Slowly return to standing position. To increase difficulty, do the exercise standing on one leg.

Questions?



Thanks!

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Thanks

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